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This serial report contains press and radio coverage on the development of and progress in the various theoretical and applied scientific disciplines and technical fields; and the administration, structure, personnel, and research plans of leading East European scientific organizations and institutions, particularly the academies of sciences.

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EAST EUROPE REPORT

SCIENTIFIC AFFAIRS

No. 765

CONTENTS

BRIEFS

COMPUTER IMPORTS FROM USSR--In 1982 and 1983 the Czechoslovak Foreign Trade Enterprise KOVO will import EC-1045 and EC-1033 computers worth 150 million rubles from the USSR. [Prague MECHANIZACE A AUTOMATIZACE ADMINISTRATIVY in Czech No 8, Aug 82 unnumbered supplement "Z DOMOVA"]

PRODUCTION OF OPTICAL CABLES--TESLA's A.S. Popov Research Institute for Communications Technology in Prague coordinates development of optical communication systems in the CSSR. It cooperates with the Research Institute of Cables and Insulators (VUKI) in Bratislava, which is involved in research and development of optical fibre cables. VUKI has developed a monofilament optical cable using glass fibres produced in the CSSR. First production of monofilament and two-filament fibre cables for shorter-distance transmissions is slated for 1985 at VUKI, followed by production at Kablo works in Decin as of 1987. [Prague SLABOPROUDY OBZOR in Czech No 11, Nov 82 p 523]

CSO: 2402/20

COSTLY SCIENTIFIC EQUIPMENT UNDERUTILIZED STATUS SYMBOL

Budapest MAGYAR HIRLAP in Hungarian 25, 26 Nov 82

[Article by Istvan Palugyai: "Millions in Reserve"]

[25 Nov 82 p 7]

[Text] "The instrument fills a dual role in the life of the scientist: it is conceivable that under certain circumstances--perhaps being accessible to other persons as well for a temporary, limited period--it fulfills its calling as a measuring device. But in its main function, it appears as one of two possibilities: a) a fetish or; b) a totem." (From the satyrical novel by Tibor Devenyi: "The Career of Dr Geza This-n-that")

At the beginning of the year, I was in Debrecen with a group of newspaper reporters. At the university's institute of organic chemistry we saw a super-duper matter-analyzing apparatus that is capable of indicating the 1 trillionth part of the gram. This gas chromatographic mass spectrometer is probably the most sensitive matter-analyzing instrument; its computer file contains data on about 40,000 chemicals. This 20-million forint machine, used for pharmacological research, when operated in three shifts--as these expensive instruments are generally utilized in countries with advanced research--could satisfy certain analytical needs even nationwide. But, we also heard that it operates only in two shifts.

"In half a minute we save half a year's work with it, and by accelerating the development period of new pharmaceutical products, its price can be recovered within 5 years," says the operator of the machine. These machines must be "fed"; their operation also demands that scientific attitudes and research organization be "adapted to them."

They say that at one of our universities a mass spectrometer has stood for 10 years and that in that time only three or four measurements have been performed with the once modern apparatus. By now, of course, it is outdated. But the prestige at the time of its purchase was undoubtedly effective.

"At over $15,000, the instrument already is a totem that not only he (the scientist--editor) but persons from other labs treat as a god. Its possession conveys a sort of demigod status. "The Career of Dr Geza This-n-that")

The instrument stock of the General and Analytical Department of the Technical University of Budapest is regarded as modern, worth about 100 million forints. As we were looking over the list of instruments with academician Ernest Pungor, dean of the department and vice chairman of the National Research Major Instrument Committee, the many valuable instruments and their rather good utilization was readily apparent. Several apparatus opened in two, and one in three shifts in the past year. Accurate statistics are also kept on the causes of down times.

"Unjustified usage is just as much of a loss as when the machine is idle," remarked the professor. "Fortunately, nowadays the instruments of the country's research network are much better utilized than they were. Fewer and fewer instruments are lying unpacked in their crates for months. The improvement is attributable mostly to the resolutions of the Scientific Policy Committee and to the work of the instrumentation committees. However, information flow across the country is still too slow. For instance, colleagues in one institute don't learn about the availability at another of the free capacity of an apparatus needed by them. So they acquire a new apparatus when with better cooperation it could have been saved. Directives published last year by the secretary general of the Hungarian Academy of Sciences urge that guest researchers to the institute have access to the necessary instruments.

"We must take subjective factors into account. Some leaders are protective of the expensive instruments. Sometimes this precaution is quite justified, since it is often more difficult to obtain spare parts and supplies than the instrument itself. The reason for this is that a nowadays outmoded regulation by the Ministry of Finance attaches these [parts] purchases to more disadvantageous conditions than the basic investment, so that sometimes an instrument costing millions is shut down for weeks for the lack of a penny's worth of junk. On the other hand, the Hungarian research establishment must give up that elegant, but expensive--and from the viewpoint of science, suicidal--attitude of basing research only on commercially available apparatuses. It is not like this at any of the leading universities of the world. Everywhere, the researchers themselves develop a good portion of the necessary instruments. If we want to end up this situation, which hinders our research, it is even more reasonable that spare part quotas and supply procedures facilitate modern development and a reduction in spending on imports."

George Paris, director of the Scientific Organizational and Informational Institute, is also conversant with the matter of instrument utilization.

"According to our investigations, from the time of approval by the institute's leader to the arrival of the instruments, on the average 30 months pass in the case of a domestic instrument, 40-50 months in the case of foreign ones. Consequently, appartuses 3 to 4 years old are generally put into operation. And although during the procurement process everybody is striving for an apparatus pool made up of uniform types, for foreign exchange reasons the institutes usually buy cheaper instruments from little-known firms rather than the more expensive established brands. Not long ago, at the Technical University of Zurich, they complained to me that they could not keep up with placing the many new appartuses. That is, the large firms are sending their prototypes to the university free of charge. Why? It is in their best interest that future engineers be familiar with their products and demand them later at their place of work as well.

"This example is a warning for us, too, because we must take notice: Many kinds of equipment cannot be manufactured domestically, and on top of that, they may be needed only occasionally--for example, instruments needed for teaching university students--but still they must be bought.

"If we cannot underake this, then the graduating youth, instead of modern methods, will get only outdated knowledge as a matter of course.

"More effective utilization is also hindered by too few operating personnel. For example, if a major instrument is purchased jointly by several enterprises, one of them is going to undertake its technical supervision and will scrape up lab technicians for this. But the supervising researcher has other work to do also, so the apparatus will operate only when he has the time. In such a case, there would be a need for new people, but in most cases there is no status, no shift differential. So, nobody will accept a second or third shift. There must be economizing with everything now. But if a zealous leader fails to order his new equipment, he bars the path to new data needed for technical development."

[26 Nov 82 p 7]

"Totems have a stern etiquette: 1) the totem cannot be a domestic instrument; 2) an instrument originating from a socialist country can fill the role of totem only if a) there is nothing similar on the Western market, and b) no obvious markings indicate its origin; 3) of an instrument functioning as totem, the institute cannot have more than one; 4) the appearance that only a highly qualified scientist can operate the totem must be maintained; 5) the totem may be operated once, or at the most twice, in a year--between uses it must be said that a) we are waiting for service from Buenos Aires, b) the helium valves need to be rested, c) the special airplane from Zurich has not arrived with the argon-trioxide, or d) the computer cannot keep up with the evaluation and we must wait." (From the satyrical novel by Tibor Devenyi: "The Career of Dr Geza This-n-that")

December will mark 25 years since the formation of the Instrumentation and Measurement Technology Service of the Hungarian Academy of Sciences. Its leader is Julius Stokum, a candidate of technical sciences, who is also secretary of the National Research Major Instrument Committee and as such is conversant with the instrument situation of our research network.

"Since 1962, the service has maintained the national instrument registry, which at present keeps track of every instrument worth more than 100,000 forints. Furthermore, we are also dealing with instrument rental and measurement technology. Our catalog library contains a description of 25,000 instruments by some 1,000 manufacturers. And lately we have been able to provide information on the equipment's available capacity and serviceability. At over 500,000 forints we consider an instrument as having medium value; over 5 million forints, major value. For the former instrument, committees of the ministries make the requisition evaluations, for the latter the national committee makes the decisions. (Procurement of apparatus of lesser value is decided by the local management.) It is a well-known fact that nowadays there is less money available for equipment purchases than before; not to mention that 2 to 3 years ago

we could get certain equipment relatively quickly from some American firms, whereas today they keep postponing the shipment."

[Question] The procurement of an instrument of major value means not only that the equipment will be placed in the laboratory. Such an apparatus often requires air-conditioned rooms and a crew to operate it. How does the Instrumentation Service help in this respect?

[Answer] We give advice to the institutes and to the committees evaluating the request. And when they have the equipment, we also help with servicing. According to directives of the National Instrument Committee, institutes and enterprises, if possible, should purchase from established firms with well-operating domestic servicing agencies. We provide this type of representation for 21 foreign firms. Many firms set up consignment stockhouses in Hungary to facilitate the supply of materials and spare parts. Of course, if only one or two pieces of equipment are in use, the manufacturer cannot be expected to open a servicing shop; therefore, for example, to exchange a major part, the machine must be shipped to the manufacturer. In such a case, servicing takes several months. Another example: Some component part becomes defective in the equipment of an industrial research institute. From Zug, Switzerland, the European center of the American manufacturer, a technician is dispatched immediately upon notification, bringing with him the new component. At the border, he declared this as a measuring instrument and crossed without any customs duty procedure. He exchanged the good component for the bad and took that one back with him. The institution, thanks to the flexibility of the manufacturer, could then order the necessary instrument component later. It is true, by the time the paperwork was done on our side, a year passed.

[Question] It is estimated that every fifth instrument required by the institutions is for short-term use. Seldom-used instruments are not worth buying by the institution, but they can rent them from you. This service, I think, is worthwhile only for you if the equipment does not stand unused.

[Answer] The instrument pool of the Service has 5,000 pieces, equipment worth about 300 million forints. At large American rental firms, 60-65 percent of their instruments are always out of the house. This is an ideal ratio, because with this sort of instrument utilization the client does not have to wait. With us, the utilization rate is 80 percent. Moreover, a portion of the stock in the warehouse is waiting for repair or disposal, so sometimes the waiting period is several months. Therefore, we introduced cooperative instrument lending. Domestic institutions with the Service's mediation may lend their equipment to other institutions, and for this they are entitled to two-thirds of the rental fee. Still, there are few willing, the traffic lags behind the potential. That is, the responsible institutional experts are not interested in the transaction.

"Nobody gives up his monopoly," said Geza Bittsanszky, department head. "And if we have unused instrument capacity, it is not good to admit it. If you don't have the instrument, the trouble is that the researcher does not have access to the partner institution's equipment. But once an institution succeeds in securing a certain apparatus, they immediately start to affirm that the equipment is fully utilized."

[Question] And the expensive apparatus is often idle, isn't it?

[Answer] Formerly, it probably happened many times, but due to the work of the instrument committees, the management of instruments is more effective. The national committee calls for accounting of unjustified down time and lengthy start ups. There was one case, when by the time the apparatus arrived, the researcher working on the problem was not with the institute any more, and the subject matter also lost its timeliness. They unpacked the instrument--and dusted it occasionally.

Together

In Veszprem 10 years ago three research institutions and the University of Veszprem started cooperative utilization of major instruments. The two industrial research organizations, the Heavy Chemical Industrial and the Hungarian Petroleum and Natural Gas Research Institutes, together with the academic Technical Chemical Research Institute and the university use each other's instruments. John Inczedy, doctor of chemistry, university professor department head and chairman of the coordinating committee, briefed me on the implementation.

"We prepared a detailed list of the equipment possessed by the institutions, which was then given to each party. We also agreed on the accounting method for the cooperative use of instruments, since we are talking about different types of management units. There are common research projects, and we also collaborate in instrument procurement, but from common planning we usually end up with just wishful thinking. The cooperative instrument utilization does not represent a very great value. (For example, the cooperative venture NEVIKI's [Heavy Chemical Industrial Research Institute] share was 77,000 forints last year, while their own revenue from the analytical department of the institute was 8 million.) In any case, the committee meets twice a year, but real cooperation depends on the researchers. It is also true that suitable instruments are needed for this. Once upon a time, the work of a scientist consisted of thinking while sitting in an easychair, maybe experimenting with a test tube. Today this is not enough. The technical level of international research means constant challenges. The pace of expansion dictated by Western instrument manufacturers cannot always be forced and is not even worth following beyond the limits of common sense. The question is, of course, will we resign ourselves to the lower standard of our instrument pool. However, it is certain that if we combine the existing equipment and intellectual energies and maximize them we can live with our reserves for a long time."

"Regardless of financial sacrifices, totem-functioning instruments must be exchanged for the most modern ones every 3 years, otherwise they become inactive and cease to be totems. And then why have them?" ["The Career of Dr Geza This-n-that"]

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REVAMPED MICROELECTRONICS PROGRAM OFF TO GOOD START

Arrival of Soviet Equipment

Budapest NEPSZABADSAG in Hungarian 24 Nov 82 p 9

[Text] The first Soviet-made production line which will be an important part of the development program for electronics has recently arrived. Mihaly Sandory, government commissioner for the electronics program, has told MTI that the electronics program which will be realized at a cost of 4.5 billion forints is the basis of a completely new branch of industry. Local industries have a great need for high-quality, special-purpose microelectronic elements.

Contracts for financing and providing credits for the 2 billion forint investments necessary have been signed. The enterprises involved will use the funds allocated to them in accord with a pre-determined schedule. Licenses and documentation for development have arrived, and the exchange of specialists between the Hungarian and Soviet enterprises which will play key roles in the program is continuing. Hungary has purchased the license for two main families of parts; the rest will be developed by Hungarian specialists.

Although implementation of the program began more slowly than anticipated, the lag has now been overcome, and it is expected to proceed as scheduled.

Currently, 1,500 persons are employed at the Mikroelectronics Enterprise which was established last spring, and there is no shortage of qualified personnel. The new enterprise was formed from what were previously the nommunications Engineering Research Institute [Hiradastechnikai Kutato Intezet] and the semiconductor plant of United Incandescent. Since its establishment, the enterprise has fabricated 600-700 million forints worth of metering automats and components which are part of the program.

Assembly of the recently arrived USSR production line is now underway. A second line is expected to arrive next year. Each such line turns out 10 million microelectronic parts annually.

Personnel Training

MAGYAR HIRLAP in Hungarian 24 Nov 82 p 4

[Text] According to government commissioner for the electronics program Sandory, the new branch of industry will ultimately employ 3,000 specialists who will require drastically different training. Budapest Technical University has already set up training courses for this purpose. The first 50 specialists have completed the course which will be offered again in early 1983. Course graduates will then provide retraining for several thousand engineers and technicians. The possibility of retraining skilled workers of the metallurgical industry is also being investigated on the basis of consultation with the trade union of iron workers.

Capabilities of IC Production Line

[Original title: "The Hungarian Processor"]

Budapest MAGYAR HIRLAP in Hungarian 10 Dec 82 p 7

[Excerpts] According to Dr Ferenc Vajda of the Central Research Institute of Physics and chairman of the work committee for microprocessor applications, the Soviet-made production line now being assembled for making IC's [integrated circuits] is capable of turning out both mass produced, already patented, mail-order type circuits and very complex, special-purpose semiconductor devices. Hungary cannot afford to be selective and opt for mass produced or special-purpose IC's only: mass produced circuitry would not be market competitive while demand for complex, special-purpose, custom-made circuitry is too limited to warrant the necessary inputs. Furthermore, the computers required for designing the latter type of complex circuitry are not available to the country.

The best solution for Hungary is to make "semi-finished" circuits officially known as "prefabricated and very complex, equipment-oriented circuits." The Soviet IC production line is actually a "silicon foundry" where the semiconductor substance is injected. The circuits are made with the aid of masks. If quantity is required, the "foundry" does the designing itself regardless of cost. The situation is precisely the reverse in the case of equipment-oriented circuits. The "foundry" takes no part in their design which can account for up to 90 percent of the cost. It simply makes the basic chips which fall between the two extremes and can be finished to meet particular specifications at relatively low cost. Thus the cost of special design can be realized even in the case of orders for series limited to several hundred or several thousand pieces because the basic chips are made en masse.

The purpose of the seminar on utilization of microprocessors recently convened in Pecs was to acquaint potential users with the system of prefabrication and design. Since assembly of the"silicon foundry" is under, the time has come to deal with form design. Although a properly trained staff capable of designing and fabricating IC's has been set up at research

institutes and enterprises, it is now necessary to designate the uses to which the IC's are to be put. In such cases, users and producers must initially speak a common language. The user must be familiar with the capabilities of the"silicon foundry" and must know something about design in order to formulate his requirements. Eventually it will be unnecessary to involve the users in the design process; the specialists of the user enterprise will become intermediaries between producers and users.

It is even possible that independent software firms will be set up which will recruit experts from both users and producers. At all events, interest in the Pecs seminar was exceptionally great, and it was virtually overwhelmingly well attended.

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STUDENTS DESIGN CHEAP, COMPACT PERSONAL COMPUTER

Budapest MUSZAKI ELET in Hungarian 11 Nov 82 p 1

[Article by Andras Juhasz: "The Hungarian Sinclair"]

[Text] At the Hungarian Academy of Sciences last fall I attended a committee meeting chaired by academician Akos Csaszar. The debate was on the role of personal computers in culture and education. Consensus on the decisive role of personal computers in developing computer literacy was so complete that this session could be classified as a discussion rather than a debate.

We already have a Rubik's Cube so we should also have a personal computer at a price and of such quality that like Rubik's Cube it can be bought by a very broad clientele, particularly the teenagers. With it they could gain knowledge to serve our country even over the long term.

Built by Students, But Not Only for Students

Gyorgy Parizs, department chief within the Ministry of Education, also spoke out at this session in favor of equipping schools with several simple, low-cost, easily obtainable and programmable computers, instead of mainframes that might easily be fetishized. For everyone suspects that such computers would be kept in the principal's room, and only a few privileged students would get to use them.

Soon after this session I visited Kiel, where educators from all parts of the FRG had convened to debate the role of computer technology.

There I heard a statement that should serve as a guideline also for us: by the 1990's, every other job in the FRG will require a specialist suitably trained in computer sciences.

We are now in a position where we must advance further, otherwise our lag could be decisive for decades to come. We must begin wide-scale instruction of computer sciences, but for this we need a suitably low-cost and simple computer, and a teaching staff who know the subject.

Students Jozsef Lukacs (ELTE [Lorand Eotvos University]) and Endre Lukacs (Attila Jozsef Secondary School), the founders of the Homelab Business Work Partnership, have successfully built a personal computer whose capabilities will

foreseeably be able to meet the requirements outlined above. Their computer is called Homelab II, and its price is about 15,000 forints.

Fits Into a Briefcase

The computer fits into a briefcase. All that it needs to operate is an ordinary television set and a simple tape recorder, with a standard tape casette. It can be programmed in BASIC and is able to generate graphics.

The soul of the computer is a Z80A microprocessor. It runs the programs, in the same way as the ZK-81 (but more effectively) and it also generates the graphics on the TV screen.

An 8K EPROM, which stores the BASIC interpreter and the machine-code monitor, and a 16K dynamic RAM are connected to the microprocessor. The applications programs can be entered into the dynamic RAM, and this is where the graphic image is stored. The computer has an additional 1K RAM for alphanumeric display, a 2K EPROM character generator, and several standard integrated circuits of the TTL type. The character generator is replaceable, and thus the character generator is able to form Hungarian letters or Cyrillic letters if desired.

Acoustical Signal When a Key Is Depressed

The computer, similarly as the ZK, has a membrane-type keyboard, but with larger keys. An acoustical signal is heard every time a key is depressed, over a built-in loudspeaker that can be used to generate other sounds as well. Most keys have three meanings: the first is a standard ASCII character, while the other two, accessible by depressing the Shift key, are each a BASIC keyword. Thus an entire program line can be typed in by depressing a few keys.

There is a screen editor (similarly as in the PET 2001) for the rapid preparation and correction of programs. Which means that for a correction it is sufficient to position the cursor (it shows on the screen where the next character will be entered or deleted) at the error, make the correction, and depress the CR key. For this purpose there are cursor-control keys and special characters (INSERT, DELETE). The screen is able to display 25 lines, 40 characters per line. This is the maximum display capacity, because the number of lines can be adjusted continuosly from 0 to 25. Adjustment is essential because, as we have already mentioned, the display is generated by the microprocessor, and therefore it runs the applications programs more slowly. As the number of displayed lines is reduced, the processing speed increases. There is a nearly fourfold increase in speed when the number of lines is set from 25 to 0 (no display). In addition, it is also possible to specify how much of the lower part of the screen is to display graphics. Thus a simultaneous alphanumeric and graphic display is feasible. An alphanumeric line corresponds to eight graphic lines. Therefore the maximum resolution is 200 x 320 pixels.

A monitor and BASIC are resident in the 8K EPROM. The monitor greatly enhances programming in machine language because with the monitor's help it is possible to directly read and modify the contents of the memory.

A few words about the BASIC interpreter. Homelab BASIC is an improved and more flexible dialect of standard BASIC (it, too, has been developed by the Homelab Business Work Partnership). The interpreter occupies 6.5K of memory, therefore it only has arithmetic of simple accuracy (6 + 0.5 digits), and thus it is also unable to recognize integer variables. However, the ON instruction may be followed not only by GOTO or GOSUB, but also by program sections written between separators. Thus we can easily run various program sections depending on the value of an expression. Furthermore, wherever a number is syntactically correct, there also an expression is syntactically correct. Hence the jump addresses of GOTO or GOSUB may be specified as the numerical value of a given expression, and it is possible to respond to INPUT with an expression. A line in the program can be as long as the horizontal character capacity of the screen, and thus even an entire large program section can be written in one line.

Computer Has Speed

And finally we present a table comparing the speed of the Homelab II with the speeds of several popular computers. The time shown is the time required to run BM-7, a benchmark program. This brief comparison speaks for itself.

ABC-80	24 sec
Apple II	32 sec
PET 2001	51 sec
ZX-81	67 sec without TV display
TRS-80	80 sec
Homelab II	20 sec without TV display
	74 sec with 25-line display

Thirteen Homelab II computers have been built so far, and one of them could be seen in operation also at the BNV [Budapest International Fair]. But there is also an abundance of problems. Today it seems almost natural that it is difficult to obtain the processor, EPROM and other memories, and the LSI circuits. More time is spent on the procurement of components than on assembly and calibration.

The Component One Does Not Install Cannot Go Bad

The proportion of import is simply catastrophic if you consider the 8-percent limit. I am beginning to understand why the large enterprises are installing unnecessary components in their products. Or rather, these Hungarian components are not entirely unnecessary, because they do have a clear function: they reduce the relative proportion of import. But as one of my professors once said, the (superfluous) component that you eliminate in designing cannot go bad.

I hope that the Homelab computer will be sold even on Saint Mark's Square in Venice, in the same way as the Rubik's cube. But a little devil tells me that we should be designing an underwater computer, because Venice will be completely flooded by the time the Homelab computer gets there.

1014
CSO: 2502/11

DEVELOPMENT OF ELECTRONICS INDUSTRY OUTLINED

Warsaw ELEKTRONIKA in Polish No 7, Jul 82 pp 3-6

[Article by Mieczyslaw Fracki, Ryszard Kujalnik and Dariusz Malicki on SEP's report on the State and role of Electricity in Poland prepared by activists in SEP's Division of Electronics and Radio Engineering: "The Electronics Industry"]

> [Text] The SEP [Association of Polish Electrical Engineers] report on the state of electricity in Poland, which in part concerns the electronics industry, encompasses the evaluation and recommendations of SEP's Division of Electronics and Radio Engineering [Radiotechnika] in relation to the range of activity of former UNITRA [Electronics and Telecommunications Industry Union] Associations ("UNITRA-Elektron" and "UNITRA-Dom"), and currently the activity of the plenipotentiary of the minister of metallurgy and engineering for matters concerning the electronics industry.

The growth indicator for the sale on world markets of products manufactured by the electronics industry exceeds 2-3 times the mean growth rate index of sales from the remaining industries, and it also displays great resistance to fluctuations of the economic situation. Currently, the growth of the electronics industry on a worldwide scale is proceeding 1.5 times faster than that of the remaining industrial fields. The electronics industry owes this dynamic growth to its newest branch--microelectronics. Microelectronics has currently become a field of strategic important to the development of a modern nation. The accessibility of microelectronic technology often becomes an instrument of economic and political pressure and also has a vital significance for the country's defense system.

The conviction exists that technically complex systems, united in large- and even very large-scale integration, will play a similar role in international relations in the mid-1980's as that currently played by crude oil. In connection with this and because of the difficult world situation in the raw materials and energy industry, assuring the rapid growth of electronics is generally held to be one of the most profitable investment moves. The dynamic expansion of uses for electronics in all areas of the economy is currently a characteristic trait of the economic growth of nations of the modern world.

Due to the fact that the main social and economic effects issuing forth from the development and practical applications of electronics appear in many, often very widespread areas and subsectors of the economy (this includes the field of manufacturing by producers of final products) and also taking into account the fact that export efficiency grows with the degree of processing raw materials, the self-financing of this field [electronics] should be aspired to mainly on the basis of the export of equipment and systems. In Poland as in some other countries such as great Britain, this industry should be given special attention by the government to ensure conditions for its growth and enable the continuation of the economy's modernizing process, the conservation of energy, fuel, material, etc. In the more distant future, the effects obtained in this way should be a source of funds enabling profitable economic investments in the development of this branch of industry.

Role of the Electronics Industry in the Country

We feel that under conditions of growing raw material and energy restrictions on a worldwide scale, the use of electronics in the national economy is one of the most sensible directions of development. At the same time, investing in the development of electronics and its applications constitutes one of the most highly effective economic activities. This predetermines to a great degree the export character of the electronics industry's production. The possibility of obtaining the effects which follow, among others, speaks for the intensification of processes involving the wide-range use of electronics in the national economy:

--Increased productivity in industry and in scientific research and administrative facilities through automation of work processes, thus making it possible to transfer 300,000 workers to the field of services. For example, the introduction of computer assisted technical design systems enables the completion of tasks which would often be impossible to achieve with traditional methods, and it also makes it possible to increase the output of project teams an average of 3 times; under domestic conditions, application of engineering calculators in the technical preparation of production gives an estimated annual profit three times greater than the outlays.

--The reduced use of raw and other materials by means of optimizing production processes, minimizing products and improving utilization, was estimated at 50 to 100 million zlotys for the 1981-1985 period. By way of example, from the telephone exchanges produced in Poland, the E-10 electronic exchange is approximately ten times lighter than its mechanical counterpart with crossbar switches (with the same amount of numbers) and requires much smaller (10 to 12 times) cubic building dimensions (resulting in savings in building construction).

Automatic operation of production processes enables the narrowing of parameters of tolerance, thus enabling conservation of raw materials and the obtainment of additional production from them; for example, the application of the domestic system of operating the continuous sheetmetal rolling mill (WCB 2000), makes it possible to reduce the per unit use of material by 1 percent. In the case of the Katowice Steelworks, which manufacturers 4.5 million tons of products annually, this saving is valued at 200 million zlotys.

The modernization of commonly-used electronic equipment makes it possible to reduce utilization of materials by 25-40 percent (by basing construction on modern self-contained [scalonych] systems). An example of this may be the electronically controlled motor of an automatic washing machine or a modern color television receiver.

--According to the opinion of experts, benefits resulting from improvements in communications and transportation systems owing to electronics, are expressed by an increase of approximately 2 percent annually in national income. By way of example, we would like to mention that regardless of the high costs charged by the Polish (Administration of) Posts, Telegraphs and Telephones [PPiT] for their telecommunications services, benefits to consumers (from having an efficient communications system) outweigh the incurred costs more than tenfold.

The electronic system of overseeing the work of cargo train station, which was worked out at the Institute of Control Systems [Instytut Systemow Sterowania] in Katowice, makes it possible to reduce the waiting time of freight cars at stations stops by 15 to 20 percent. The train surveillance system worked out at the same Institute makes it possible to increase traffic capacity of railway routes by 20 percent. Both systems reduce the need for railway rolling stock [tabor kolejowy] by 10 percent.

--A reduction in the use of liquid fuel, owing to the adaptation of electronics to automobiles has been estimated at 350,000 tons for 1985. In the area of motorized transport, the use of an electronic ignition and control of fuel mixture composition as well as the maximizing of fuel feed according to driving conditions, would allow a 10 percent reduction in fuel use. This would produce savings of approximately 50 million dollars annually in the area of passenger cars alone, which are in use in our country. The current cost for equipping a car with such electronic devices in the U.S. comes to approximately $150 and with such fuel savings, the cost would pay for itself in less than 3 years.

--A stronger national defense system through the continual improvement of military equipment as well as command and communications systems. The rapid growth of the use of electronic equipment and systems in combat vehicles, ships and airplanes is significant.

--Mass dissemination and modernization of education systems through radio broadcasting and television systems, among others, as well as through use of electronic media in teaching which has a direct bearing on increasing the cultural level and the political and social awareness of citizens and their ability to withstand the effects of psychological warfare.

Aside from the above-mention examples of the more important uses for electronics, two ways in which it can be used should be stressed because of their high economic and social effectiveness:

--The electronics industry supplies attractive equipment to the market and motivates increased productivity. Among other things, increasing supplies to the rural market of modern television sets, radio-recorders, phonographs and video recorders constitutes a strong incentive for increasing production and sale of agricultural products.

--The use of electronics in production is one of the conditions necessary for increasing export trade, improving its efficiency and modernizing its structure. It should be realized that the Polish line of exports will not be competitive without electronics, and in some cases their sale abroad will not be possible. This is particularly important for those sectors or areas which already have acquired a certain wealth and reputation on foreign markets such as for example, the shipping industry, sugar-processing factories, factories producing sulfuric acid, mining machinery, the food industry and others. It is already possible to predict now that, among other things, after 1985 the export of telephone sets or passenger cars will not be at all possible without the introduction of essential electronic changes. The electronic subassemblies industry constitutes barely 0.5 percent of the nation's industry. And yet, in the very near future, these manufactured items will decide about half of Poland's export trade. They will decide the materials-intensiveness of the national income, the possibility of creating humane and safe working conditions, efficiency in production and in the use of energy, market stability and growth, and the quality of life for each one of us. In the case of the electronic subassemblies industry, the significance of its production for society is much greater than it would seem from the official value of sold production.

Existing Potential and Situation of the Electronics Industry in Poland Within the Framework of the two Former UNITRA Associations (UNITRA-Elektron and UNITRA-Dom)

The intensive development of the electronics industry began in the years 1971-1975. During this period, both the need for modernizing the production of marketable goods and what is more important, the significance of strengthening the subassembly base for the country's electronic needs were recognized. As a result, on the basis of the Resolution of the Sixth PZPR Congress, Resolution No 148 of the Government Presidium was undertaken in June 1971 which ratified the plan for the complex development of the electronics industry in Poland. Investment outlays for this development in the years 1971-1975 were nearly three times greater than the funds spent for this purpose during previous 5-year periods. This make it possible to achieve the following increases during the 1971-1975 period:

--225 percent increase in market supplies,

--330 percent increase in the production of electronic subassemblies,

--a 257 percent gross increase in the production of computers and

--a 258 percent gross increase of exports including an increase of 838 percent to the second payments area [capitalist countries].

Growth plans for the years 1976-1980 assumed the continuation of the growth rate from the pervious 5-year period, with anticipated greater investment and foreign-exchange funds. As a result, a series of foreign licenses were bought mainly for modern subassemblies. These licenses were judged positively from a technical point of view by a commission appointed in 1981 by MNSzWiT

[Ministry of Science, Higher Education and Technology]. This enabled true modernization of market products, the export of equipment to tough capitalist markets, and the taking on by other industries (telecommunications, computer, mining) of the production of fully modern manufactured goods. This also included plants which manufacture equipment for defense purposes. Equipment destined for the market and manufactured by the electronics industry "surpassed" the level, in this relatively short 5-7 year period of time, of producers from CEMA countries such as GDR and the Czechoslovak Socialist Republic which used to be ahead of us.

However, a negative aspect of all this activity was the considerable dependence of products manufactured by the Polish electronics industry on the import of subassemblies and especially of raw and other materials from the second payments area. This was caused in part by the effect of the purchased licenses. However, the main reason for this dependence was the "unsynchronizing" of the industry's development between 1978-1980. Investment delays took on the most threatening form in regard to the development of the production potential of materials for the electronics industry, which currently hold one of the more important positions in the import trade of the second payments area. These phenomena were not of primary significance but frequently caused the incompletion of many segmentary [sycinkowych] tasks as a result of which gaps formed in various complex technological processes. Consequently, this caused among other things, the incomplete utilization of already-installed production capabilities. This means that the existing potential is not properly balanced and may, in effect, considerably increase production capacity with relatively small outlays.

In parallel with the collapse of the electronic industry's investment process, a similar phenomenon occurred in the chemical industry, the building materials industry, the steel industry, and others which did not fulfill their assumed responsibilities. In particular, the limited supplies of plastics and semifinished products manufactured by the chemical industry have currently made them the electronic industry's basic imports from the second payments area.

The electronics industry was seriously hurt during the years 1976-1980 by the, so-called, "economic maneuver", as a result of which a collapse occurred in the development of professional electronic equipment. This equipment which distinguished itself with a particularly large contribution of technical ideas to the process of the development and technical preparation of production, could have created much more profitable export commodities, in a properly functioning economy, than equipment destined for the market. We were in a very favorable situation by, at that time, possessing more than 60 percent of professional equipment in the export structure.

In describing the 1976-1980 period, the loosening of ties of scientific, technical and economic cooperation with CEMA countries in favor of import and export trade with capitalist countries should also be stressed. Despite gradual improvement, this led to the formation of constant surpluses of import values over export to the second payments area. Not until 1981 was it possible to stabilize to a degree this balance from the second payments

area within the framework of the two former UNITRA associations, and with an almost complete hold put on investments. This phenomenon demonstrates that despite mounting problems with exports to the second payments area and the currently unavoidable import of goods from this area, the electronics industry which currently employs 100,000 workers within the framework of UNITRA, could maintain a full production schedule for the purpose of implementing current operational plans and for supplying the market with goods in the order of 20 billion zlotys (according to 1981 sale prices) under the following conditions:

--by obtaining the right to fully balance imports with our own exports (tasks should obligate the electronics industry to gradually achieve surpluses or exports over imports),

--expanding cooperation between CEMA countries and gradually reorienting export and import trade to these countries while keeping in mind the limiting of imports from the second payments area to a minimum,

--in utilizing the potential of technical ideas, to stress the development of professional equipment produced on a small scale or in units for the purpose of obtaining better export ratios.

Limiting or halting the development of the electronics industry as a result of a lack of foreign-exchange funds from the second payments area will cause enormous losses in the face of the very dynamic growth of this branch of industry in the entire world. It is estimated that every year lost in Polish electronics increases our delay in respect to developed countries an average of 2 years. This will cause the large amounts of funds invested during the 1970's to become obsolete while the accumulated, frequently very highly qualified human potential will disperse. As a result, this may lead to the necessity for long-term and costly regaining by our country of that position, which our industry already had among developed countries.

Problems and Recommendations

The electronics industry, as a supplier of subassemblies, functional blocks [blokow] and professional equipment, plays an important role in modernizing the economy (with electronics). This has a significant effect on the conservation of materials and energy; on increasing work efficiency and safety; on the export trade, etc. Aside from this, generally used items such as television sets, radio receivers, tape recorders, etc. play an important part in filling the domestic market, in making it more attractive; and at the same time they are a strong incentive for farmers, among others, by encouraging them to produce and sell agricultural products to the state. Despite this, the electronics industry has not directly become the subject of operational programs due to the precedence of "primary needs" (Agriculture, health, defense, etc.). In this situation, the real threat of standstills exists for a considerable number of plants of the electronics industry in the face of this industry's unavoidable import needs resulting from insufficient investment in [niedoinwestowania] the subassembly base due mainly to the inability to purchase indispensable raw materials and semifinished products from the chemical,

steel, building materials industries and others. This situation, therefore, threatens to devalute capital investments of previous years, and also to disperse human potential created in the years 1970-1980. This would cause an irreplaceable loss as a result of, among other things, the very rapid worldwide development of this branch of industry.

In order to prevent this from happening, the following are proposed:

--The creation of an independent and self-financing, in terms of foreign-exchange, organization (association) on the basis of the production units of former associations of the Subassemblies and Electronic Materials Industry "UNITRA-Elektron" and the Electronics Industry "UNITRA-Dom". The organization under discussion would conduct its own policy of trade, economic and scientific-technical cooperation with abroad within the framework of the general principles defined by the Planning Commission and Ministry of Foreign Trade. It would be particularly directed toward expanding cooperation with CEMA countries. This would allow, on the basis of funds obtained from the export of finished products, the financing of imports indispensable for the production of goods included in operational plans, as well as the production and development of goods supplied to the market with a value (at 1981 prices) of approximately 20-25 billion zlotys annually. It is estimated that after 2-3 years, this organization will be able to begin turning over foreign-exchange surpluses for the needs of the state.

--We feel that the Office of the Plenipotentiary to the Minister should be given appropriate powers of attorney [pelnomocnictwa] which would enable operative and efficient activity. In the case of the creation of an association, it is our opinion that in its first phase this should be an obligatory [obligatoryjne] association. However, its intentional transition to the status of a voluntary association is desirable after the economic and essential integrating mechanisms have had a chance to work. The proposed organization should have the following capacities:

--to conduct an independent policy of economic cooperation with foreign countries (in terms of its sphere of activity) including the capacity to make decisions in the matter of the sources of financing and choice of contractors and sources for making purchases. This organization should also have freedom in assessing the profitability of exports in association with imports which make it possible to maintain production and the supply of goods to the market;

--to independently conduct investment and developmental polices which would permit, among other things, development of the export structure from the point of view of its maximum economic efficiency. The intensive growth of export production of professional electronic equipment and of industrial authorities control engineering [automatyka] with the large participation of technical thought and work should be anticipated. It is assumed that development in this respect will be directed towards cooperation and complementary [uzupelniajaca] production on behalf of those sectors and divisions which already have a good reputation on foreign markets; for example, the shipping and aircraft industries, mining and certain sectors of the chemical industry (factories producing sulfuric acid) and of the food industry (sugar factories.

--to engage in joint developmental-production undertakings for the purpose of activating the production of specialized subassemblies, in economically substantiated cases. There is an anticipated need for engaging in such undertakings with the following industries, among others: computers, automatic-control engineering and telecommunications, on the basis of joint financing;

--to carry on and to finance coproduction and developmental cooperation with the chemical, steel and building materials industries in terms of supplying special materials for the needs of electronics.

We also propose that the implementation of economic reform be accelerated to the extent that would encourage efficiency on the part of enterprise workforces and their management on the basis of properly functioning economic mechanisms. This would enable efficient noninvestment undertakings which would, for example, improve the use of materials and machinery and would increase technological output; i.e., undertakings that lead directly to increased management efficiency. By way of example, we can mention here:

--the activation in subassembly plants of the byproduction of simple market products manufactured from dispersion [dyspersyjnych] subassemblies; elements all of whose parameters do not confirm to technical conditions (as a result of technological disperson) but which are suitable for a variety of specific uses,

--subassembly as well as equipment plants would have a basis for deciding among each other upon economically substantiated quality-dependable [jakosciowo-niezawodnosciowych] requirements which would lead to increased technological productivity of subassemblies without lowering the funcational quality of equipment.

In view of the fact that prospective development of materials and subassemblies for the electronics industry in all developed countries constitutes an area of profitable investments with strategic significance, it is proposed that the Government Program PR-3 entitled, "The Development of Materials and Subassemblies for the Growing Needs of the Electronics Industry" be maintained and that this program be assured funds at a level which would enable the electronics industry to play the role of a cooperative-supply base stimulating the growth of the other industries and other sectors of the national economy.

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INDUSTRIAL ACHIEVEMENTS REPRESENTED AT BUCHAREST FAIR

Electronics Industry

Bucharest REVISTA ECONOMICA in Romanian No 39, 1 Oct 82 pp 8-9

[Article by Ioan Georgescu]

[Text] Current efforts to upgrade the activity of foreign trade are expanding to also involve the vanguard area of marketing technique -- promotion of Romanian exportable goods.

In line with the modernization of the economic branch pattern, the diversification of Romania's industrial production in the past decades, the broader and broader participation in the world economic circuit (this year export provides 34% of the national income), the need for presenting on the foreign market the radical changes involved in our country's export offer has expanded. Industry now ensures about 60% of the national income and in the makeup of industrial production the input of the machine building, chemical and metallurgical industries is more than 50%. Moreover, the standards and provisions of world trade currently mandate the development of an activity to promote exports based on professional utilization of mass media, promotional graphics, design and, certainly, on intensive marketing.

The modern display complex in Bucharest's Piata Scinteii — which, in a few days, will house the 8th Bucharest International Fair -- provides optimal conditions for the combined presentation of the the Romanian industry's export supply; 450 industrial centrals, scientific and engineering research institutes, industrial and foreign trade companies in machine building, electrical engineering, electronics, chemical and metallurgical industries, transportation, construction materials, light and food industries, and artisan industries will be represented in the key trade event of this year.

Naturally, we begin the presentation of participants in this fair with the machine building industry which today has an input of more than one-third in the volume of the country's industrial production. According to the Directives of the 12th RCP Congress on Romania's socioeconomic development under the 1981-1985 Five-Year Plan and long-term guidelines by 1990, the machine building industry will continue to be the most dynamically growing branch. More than 30 subbranches of the machine building industry, involved in 16 industrial centrals, display their exports at this fair. The tremendous growth of these industries under the last three five-year

plans -- at rates ranging between 4.1-7.5 times for facilities, machine tools and electrical engines, 25 times for products of the fine mechanics and optical industries, 40 times for automation and computer products -- now places this country among the chief world makers of heavy machine tools, petroleum equipment, rolling stock, and ships, aeronautical, computer and other products.

We begin our presentation with the central section (A), dwelling first on the electrical engineering and electronics industry, which, under the socialist industrialization policy, consistently furthered by our party, has always been a major concern.

During the 1970-1980 period, the annual average growth rate of the electronics and electrotechnical output was 18.1% versus 15.9% for all the machine building output, and projections for the 1981-1985 Five-Year Plan involve an annual growth rate of more than 20%. The ample development of these subbranches in this country clearly reflects the party policy of promoting new advances in all economic areas by computerization of production and decision-making processes.

The emphasis placed at this stage on intensive growth avenues, including the one involving exportation of key technological products originates in the fact that they make best use of materials, labor and creativity, permitting the production of items characterized by great value, minimal consumption rates for raw materials and energy, a paramount feature in the context of lower and lower accessibility to energy and raw materials on the world market. As for the technical standard and performances of Romanian products, the industrial centrals of electronics and computer products provide telling illustrations at the Bucharest Fair. For the first time at this fair there will be a combined presentation of the achievements obtained in various units of Romanian research into robotics. For instance, "Titan" research and engineering institute will for the first time present the RIS-63 industrial robot, that can be computer programmed for a wide range of operations -- especially for operating machine tools. This type of robot was made completely out of Romanian components and ensures the operation of parts, instruments weighing up to 63 kg. The expansion of this key sector of electronics accords with the efforts to replace the human operator, in monotonous, arduous operation or in conditions that are dangerous and hostile to man, with the robot operator.

Bucharest "Automatica" factory will present the RIP 6.3" universal industrial robot that can be programmed for different operations: welding, feeding machine tools, assembly, painting, polishing, and the like. It must be stressed that all its subassemblies -- servomotors with low inertia, harmonic reducers, control system, sensors, internal state transducer are Romanian-made. Very sought-after, the robot of the "Automatica" factory will start being produced in a few months time.

The Cluj Polytechnical Institute, in conjunction with the Bucharest Computer Factory present the "Robopas", a robot that embodies two top achievements of Romanian technology -- the step-by-step drive motors and the FELLAS control systems made by the Bucharest Computer Factory. The name of FELLAS derives from the Romanian computers Felix (FEL) and laser (LAS), designating systems capable of operating based on data transmitted htrough optical fibers by laser. The robot is designed for highly sensitive and accurate operations, with a payload of 25 kg and 8 degrees of freedom.

In response to the economic needs for greater automation of industrial equipment and processes, by their robotization and computerization, as chief factors in raising

labor productivity, achievements include automated assembly lines, ESCAROM 881 and ESCAROM 600 industrial automation computers, NUMEROM 306 and 307 digital control facilities, signal indicators, and so forth.

The need for remote transmission and automatic processing of a greater and greater amount of information in all socioeconomic areas, with broad utilization of computer technology is very effectively resolved by FELLAS machinery, computers and minicomputers Felix, Independent, high capacity computers Coral 4001 A and 4011 A, memory systems SDC 2050 and the like, interactive graphic systems intended for computer-aided designing, telecommunications and automation equipment, such as minirecorders ELR 352, ultrasonic generators type N 3101, ultrasound processing installations, rapid and ultrarapid fuses, low silver content electric contactors, high energy magnets, and so on.

The electronics facilities and components are increasingly smaller but have greater and greater performances, symbolizing the drop in materials expenditures and the rise in the value added as a result of research-design-production (the value of know-how incorporated is greater than the value of the materials), also resulting in the significant increase in the value of the production systems which they monitor and control.

A case in point is the variable condenser made by the Industrial Electronics Enterprise and the flexible support circuit made by the Research and Engineering Institute for the Electrotechnical Industry.

Displays in the area of electronics measurement and control machinery will include optical pyrometers for remote measurement of high temperatures, spectrometers for rapid spectral measurements and tests, instruments to measure depth for ships, a powering and automation facility for sea drilling, and modern seismic and gravitational measurement equipment.

The year 1981 saw the initial production of hundreds of new kinds of electrotechnical and electronics machinery and items, including: alphadigital and semigraphic displays DAF-2010; electronic control and cash register machine AECG 8021 (for restaurants); a stationary radioreceiver with cassettophone, electronic control machinery in the textile industry; special outfits for drilling installations.

All these achievements prove that our industry has a significant creative force, both in research and engineering institutes and centers and in the plant research and development units, capable of meeting the great needs of the modern scientific and technical revolution.

Machine Tool Industry

Bucharest REVISTA ECONOMICA in Romanian No 40, 8 Oct 82 pp 15-16

[Article by Ioan Georgescu]

[Text] The 8th Bucharest International Fair opened yesterday. In this issue we continue to present the Romanian supply with other subbranches of the machine building industry, well represented at this fair by new kinds of products that symbolize the vigorous involvement of Romanian science and technology in the modern scientific-technological revolution.

Romania today ranks among the chief world makers of machine tools. The large allocations for this branch, specifically under the last three five-year plans, have permitted significantly meeting the economic needs and the constant expansion of export. For instance, the period following 1975 saw the designing and start of production of new kinds of machine tools which now are strong points in the export schedules of this subbranch. They include:

a. Heavy one-base vertical lathes with a machining diameter between 5-10 meters, made by the Roman Mechanical Enterprise, and two-base lathes with machining diameters between 5 and 16 meters, made by the Bucharest Machine Tool and Aggregates Enterprise;

b. Heavy parallel lathes with the machining diameter between 1250 and 2500 mm, made by Craiova Heavy Equipment Enterprise, Ploiesti "1 Mai" Enterprise and Arad Machine Tool Enterprise;

c. Horizontal reamers and cutters with the broach diameter of 160, 180, 200, 240 and 300 mm, turned out by the Bucharest Machine Tool and Aggregates Enterprise jointly with the Bacau Machine Tool Enterprise;

d. Portal cutters with the table size of from 1000 to 3500 mm, made by the Bacau Machine Tool Enterprise and the Craiova Heavy Equipment Enterprise;

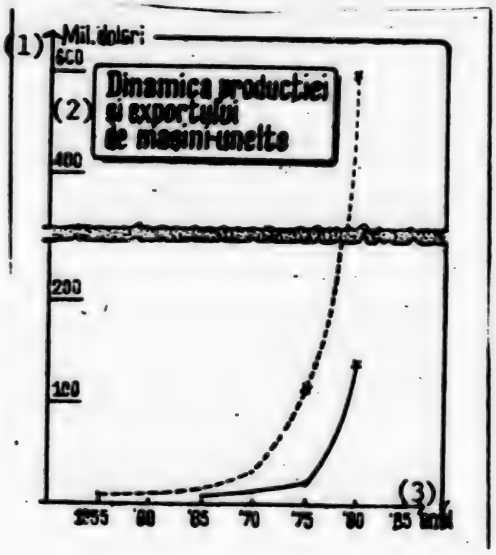
e. Machining centers with horizontal and vertical axle, made by the Bucharest Machine Tool and Aggregates Enterprise, Oradea "Infratirea" Enterprise and Bacau Machine Tool Enterprise;

f. Slide grinders with machining sizes of from 1000 to 2000 mm, turned out by the Bucharest Machine Tool and Aggregates Enterprise.

Noteworthy is the fact that heavy machine tools are indispensable in execution of power producing equipment. The 19 machine tool making enterprise of this powerful subbranch of the machine building industry are organizationally grouped in the Machine Tool Industrial Central, which has its own designing institute -- "Titan" ICSIT. Under the 1976-1980 Five-Year Plan, as reflected in the statistical figures (see graph), an important quantitative and qualitative leap was made in Romanian machine tool production by consolidating the manufacturing of heavy machine tools, digital control machines and special machine tools.

Following modernization and development of new facilities within the framework of the enterprises: Bucharest Machine Tool and Aggregates Enterprise, Oradea "Infratirea," Bacau Machine Tool Enterprise, Roman Mechanical Enterprise, and following the construction of new units such as: Craiova Heavy Equipment Enterprise (for heavy portal cutters and heavy parallel lathes), Tirgu Jiu Enterprise of Machine Tools for Presses and Forges (for mechanical and hydraulic presses from 160 to 630 tf), Iasi Special Machine Tool and Aggregates Enterprise (for standardized sections and special machines), Baia Mare Machine Tool, Accessories and Tool Enterprise (for grinders and broachers) and the like, Romania now has one of the world's broadest production lists in terms of heavy machine tools, machines which a few years ago were only supplied to the world markets by several makers: West Germany, the United States, France and Czechoslovakia.

We emphasize, among the new or modernized products -- which account for about 80% of the subbranch displays -- the achievements of new machine tool enterprises, with highly efficient products. We point out the specialized enterprises in Dorohoi, Marghita, Timisoara and so forth.



Key:
1. Million dollars
2. Dynamics of machine tool production and export
3. Year

Chiefly characteristic of this exhibit is the fact that most displays are specialized machine tools for a specific industry: for the automobile, ball bearing, woodworking and other industries. For instance, the Arad Machine Tool Enterprise displays, among the specialized machines for the automobile industry, the flowing chip piston lathes SF-160 with four operation points and SFD-250 with two operation points and the watch lathe SV-360 C_2 destined for fine mechanics sectors, the production cell composed of the SAC automated copying lathe for wood and sanding machine coupled in automated cycle.

Another first involves the flexible cells -- designed and produced within the framework of CIMU [Industrial Central for Machine Tools] for various kinds of machining processes (for cases, disk parts, shafts, and the like).

The Bucharest Heavy Machine Enterprise displays a model of the 12,000 ton press, another prestigious achievement in the area of machine tools.

Moreover, very well represented at this fair also is the industry of transport facilities: automotive, railroad, maritime and air.

The Brasov Truck Enterprise displays a wide array of trucks and dump trucks with one and two axle traction, their array being supplemented by the products of the Mirsa Mechanical Enterprise up to the capacity of 110 t, by the Diesel electric dump truck,

with the 1200 HP Diesel engine, powering the electric generator that drives the driving wheels. New products include new types of road trains, tourist buses and minibuses (Tudor 105 D) made by the Bucharest "Autobuzul" Enterprise, the 1983 Dacia car models -- Dacia 1320 break and berlin, Dacia 1310 Diesel and sport, Dacia 1304, ARO 322 Diesel jeeps, the OLTCIT automobile. The "Navimpex" foreign trade company displays models of 55,000 dwt bulk carriers, 3,000 dwt refrigerator ship, 300 dwt coastal fishing vessel, turned out by the Galati Naval Shipyard, harbor tugboat and supertrailers from the lists of the Braila Naval Shipyard, 32/tt floating crane, produced at the Giurgiu Naval Shipyard.

Displays from the "23 August" Enterprise include Diesel-electric locomotives with 1500 HP ALCO engines and 1100 HP M 820 engines. The Braila "Progresul" Heavy Equipment Enterprise displays the P-801 hydraulic excavator with polyped grab and hydraulic hammer, and the redesigned 180 HP S-1 202 excavator (with ergonomic cab). New makers of transportation-handling equipment displaying at the fair include the "Dr. Petru Groza" Mechanical Enterprise, that exhibits new types of electric cars and electric trucks, and the Timisoara Mechanical Enterprise, that displays its new electric telescopic arm cranes.

Very interesting are the achievements of the Research and Engineering Center for Factory Lifting and Transportation Machines in the area of air cushion transport; 1.6 ton portal crane, fitted with electric hoist, air pallet with propulsion device for 1 ton.

At this fair the National Aeronautical Center displays the model of the ROMBAC 1-11 jet transport -- medium courier -- turned out in conjunction with British Aircraft Co, England. Also on display are helicopters, motorgliders and aircraft for various purposes of Romanian make.

The foreign trade company "Industrialexportimport" exhibits new types of drilling installations F-125 and IF-200, with electric control. One of the oldest Romanian machine building enterprises -- Resita ICM -- displays models of hydraulic turbines made this year and also of air compressors L 50-500.

The Industrial Central for Tractors and Farm Machinery has greatly expanded the range of agricultural machines, from one Bucharest fair to another. The new types on display include the crawler tractor for slopes and the narrow universal tractor -- made by the new specialized plant in Miercurea Ciuc, the combined seeder produced by the Piatra Neamt "Ceahlaul" Mechanical Enterprise, the superelevated tractor -- made by the Codlea Mechanical Enterprise, and, of course, the modernized CU-14 universal combine, with greatly improved parameters, made by Bucharest "Semanatoarea" Enterprise for Agricultural Machines.

Key products of the Industrial Central for Electrical Machines and Appliances include: the ore magnetic separator, high voltage electric cells for quarries, 72.5 kW high voltage switches (for export exclusively) made by Craiova "Electroputere." The Research and Engineering Center of the central also realized highly-advanced products such as: the electronic weighing installation for travelling cranes and the monitoring facility based on ultrasound transducers in power transformers, outfits that are very effective economically in preventing breakdowns. In the area of consumer goods and goods for social institutions we point out the wide selection of

electric lamps (ornamental, photography, automobiles, projection), displayed by Fieni "Steaua Electrica," the new types of electrocaloric consumer goods designed by ICPE [Research and Design Institute for the Electrotechnical Industry], dishwasher, an improved model of copying machines MCE-2, new kinds of medical apparatus (cardiac rhythm tester, electroshock apparatus, portable monitor), designed by the Research and Design Institute for the Electronics Industry.

Chemical Industry

Bucharest REVISTA ECONOMICA No 41, 15 Oct 82 pp 14-15

[Article by Iustin Rogoz, deputy minister of the chemical industry]

[Text] The 8th Bucharest International Fair was an important manifestation of the creative capacity and force of our people, of the dynamism of our industry, vigorously engaged on the path of modernization, upgrading of the quality and competitiveness of products, and reflected Romania's participation in the international division of labor, in the promotion of mutually advantageous economic cooperation with all the states, in strengthening of world peace.

The conclusion of the fair is an opportunity for us to survey the involvement of our sector. As usual, the Romanian chemical companies displayed in a specialized pavilion exhibiting products from 100 streamlined enterprises, mirroring the active production and export potentialities of this basic branch of our industry.

Graphs and pictures illustrated the amplitude of the development of the Romanian chemical industry under socialism, specifically during the period that has elapsed since the 9th Party Congress, as a result of the implementation of the directives given by Nicolae Ceausescu.

Significant is the fact that the substantial input of the chemical industry in Romania's total industrial output -- which now is about 11% -- is expected to increase by the end of the five-year plan to 12.9%. By 1985, more than 400 industrial facilities will be put into operation and the marketable output is expected to be 46% higher and net output, 100.8% higher than what they were in 1980.

All this will make it possible for our export of chemical products, which went up by a factor of 13 under the last three five-year plans, to show further major rises, specifically in terms of diversification of lists and increase in the volume of highly processed items, especially in the area of low-volume production and fine synthesis.

Exported to more than 110 countries, Romanian chemicals have in recent years won more than 50 gold medals at prestigious international events. This year we have displayed our chemical products at more than 30 fairs and shows. We point out that at the Bratislava INCHEBA 1982 fair and at the Moscow CHIMIA 1982 show the Romanian chemical pavilions, as a whole, received honorary awards for the quality of presentation.

The first section of the chemical industry's pavilion at the 1982 Bucharest International Fair focuses on research and engineering. Conducted under the guidance of academician Dr. Engr. Elena Ceausescu, research activity has proved to be decisive for the rapid growth of this key industrial branch. Significant in this respect is the fact that more than 95% of the 570 production facilities completed under the 1976-1980 Five-Year Plan are based on technologies developed by units of the Central Chemical Institute.

Centered on developing new technologies and modernizing existing technologies, in order to ensure the superior utilization of raw materials, attainment of minimal consumption rates for materials and energy, and obtaining of high quality products, the activity of the units of the Central Chemical Institute last year materialized in completion of research for almost 1,800 topics, with technologies developed for about 300 new and modernized products.

Suggestive models in the pavilion presented the flow charts of major chemical products patented recently: hydroxyethylenecellulose, the fungicide Onefung, methionine, azoic dispersion dyes, emulsifiers for phytopharmaceutical products, amines, fodder dicalcic phosphate, cellulosic fibers, and so forth.

Our chemical products displayed at the 1982 Bucharest International Fair under the sponsorship of the foreign trade companies CHIMPIMPORTEXPORT, DANUBIANA, and PETROLIMPORTEXPORT satisfy the current market needs, at the levels requested by world trade in chemical products, where, as is known, there was and still is keen competition.

The foreign experts and businessmen who inspected the displays in the pavilion of the chemical industry had the opportunity of noticing an interesting fact regarding the diversification of production, the upgrading of quality and renewal of items, which are factors in boosting their competitiveness.

The displays in the area of inorganic chemistry included new kinds of sodium and chlorosodium products, silicates, aluminum sulphates, magnesium and barium oxides and salts, which are well assessed on the foreign market. On show also were many products in the area of organic chemistry, including acids and solvents, in demand for export.

The petrochemical industry, whose priority task is upgrading crude oil and methane gas processing, was broadly represented. On display was a wide array of benzines, fuel oils, paraffins, various oils, including the ones destined for the new car OLTCIT. The major petrochemical products were shown. They included dimethylterephthalate, plasticizers, macromolecular products such as polystyrene, low and high density polyethylene, polyvinyl chloride, various kinds of synthetic rubber CAROM-butadiene-styrene and polyisoprene, and terpolymers.

Moreover, amply represented at the 1982 Bucharest International Fair were the rubber and plastics processing sectors. The more than doubling of the synthetic rubber output during the 1980-1985 period permits the considerable rise in the production of processed items. For instance, in the tire industry, the output for this year is expected to be 6.7 million tires, versus 1981, when the output was 5.2 million. On display were radial tires of various types and sizes for automobiles, trolleybuses, buses, tractors and other farm machinery.

On show were hundreds of parts of the industry of technical items out of rubber, which are in great demand. We point out the parts destined for automobile production. Moreover, this section of the fair reflected the way in which the chemical industry provides rubber technical items to various industries, agriculture and the consumer goods sector.

Compared to 1980, in 1985 the production of items processed from plastics is expected to increase 201.5%, an expansion which was mirrored in the wide range of displays

in this area. On show were items made out of various plastic materials, destined for industrial use, for use in other economic areas, and for use by the population.

A booth with items of the nonferrous metallurgical industry reflected the achievements in the area of making aluminum, copper, zinc, and so on.

Also appreciated were the photosensitive products with the AZOMURES brand, among which we point out: AZOIX, medical radiological film; AZOPLAN, panchromatic negative film; GAMAGRAF, industrial radiographic film, photocolor paper and black and white paper; AZOCIT phototechnical film (ortho and contact); AZOCOPY document-panchromatic film, black and white and color cinema positive film.

Agriculture requests not only growing amounts of fertilizer, growth stimulants, and pesticides but also continuous upgrading and diversification of these items, for the purpose of boosting their practical efficiency. Romanian chemical fertilizers -- technical crystallized urea, granulated urea, ammonium nitrate, nitrolime, ammonium sulphate, granulated and concentrated superphosphate, NPK complex fertilizer -- on show at the fair are competitive and sought after abroad. The broader supply is based on the rise in the production of chemical fertilizer, which in 1985, versus 1980, is expected to be 165% higher, and on the efforts to develop new products. These new products include liquid nitrogen fertilizer for agriculture, fertilizer for vegetables, urea with microelements, sulphur coated urea, complex potassium fertilizer, nitrophosphates with microelements, whose production can be expanded in accordance with the needs of domestic and foreign users.

As for the production of pesticides, during the 1980-1985 period it is expected to go up 240%, with the focus on producing herbicides with greater effectiveness and lower remanence.

Romania turns out almost all kinds of major chemical yarns and fibers known in the world. Our man-made fiber and yarn production is expected to grow 220% in 1985 versus 1980. On display at the 1982 Bucharest International Fair were the well-known Romanian products TEROM (R), MELANAR (R), RELON (R), DUNATEX (R), and DUNACOR in a wide range: filamentary textile yarn, textured yarn, cotton and wool type yarn, technical and cord yarn for tires, rug yarn, and the like. By using special spinning effects, experts in this sector are aiming at obtaining special effects, such as: polyester yarn with triangular section, shaped polyamide yarn, complex fiber with polyamide core and coating, and so forth.

Very interesting booths in terms of presentation and new developments were the ones displaying pharmaceuticals, cosmetics and perfume products, chemicals for household use, dyes, varnishes and paints.

In 1985, versus 1980, the production of medicines is anticipated to treble, the production of detergents, to go up by a factor of 3.2, and the production of cosmetics, by a factor of 2.9. In addition to well-known Romanian drugs such as: GEROVITAL (R), ASLAVITAL (R), TROFOPAR (R), ULCOSILVANIL (R), BOICIL FORTE (R), COVALITIN (R), newly industrially produced drugs have appeared: APILARNIL, a biologically active apicultural product used as a tonic; TARBEDOL, a regulator of digestive secretion; PLAFEN, antialgic; ERGOCEPS, peripheral vasodilator; CORNHIDRAL, vasoregulator and analgesic.

Newproducts were also displayed in the area of the cosmetic industry: the ACANTA cosmetic treatment set, based on biologically active apicultural products that maintain the metabolic balance of the skin and control scarring processes, GERO-VITAL massage cream in a new formula containing a series of plant substances which prevent and combat skin ageing phenomena, DERMIN, an anticellulitic massage cream, the MIRAJ makeup kit, SUPER FAUN cologne, MUGUREL products for children, OSSIDENTA medicinal toothpaste, and so forth.

The Romanian chemical industry is now turning out a wide range of dyes, varnishes, paints, and enamels for domestic and foreign consumption. Displays included modern kinds of dyes for man-made yarn and fiber and special dyes for PNA fiber. New paints and varnishes included those destined for OLTCIT and Dacia automobiles, electroinsulating paints, special paints for the construction sector, and so on.

By their number, quality and manner of presentation the Romanian chemical products on show at the 1982 Bucharest International Fair provided good opportunities for concluding transactions designed to promote international trade and cooperative relations in this basic economic sector.

Hence, in compliance with the streamline of the fair, this event saw the signing of many contracts for various chemical products. Major contracts involved: dyes, synthetic resins, solvents, caustic and ash soda, PVC powder and granules, plastics items, fertilizer, tires, synthetic rubber, and so forth. Partners included: the People's Republic of China, France, West Germany, Ghana, Greece, India, Iran, Italy, the Soviet Union, the United States, and others.

During the inauguration of the fair, on visiting the pavilion of the chemical industry, party secretary general Nicolae Ceausescu carefully examined the displays, specifically assessed their characteristics and qualitative level and requested that all steps be taken to promote the development at the planned rate of all the sectors of pharmaceuticals, cosmetics, detergents, gas chemicalization, for the superior utilization of raw materials. To us, the workers in the chemical industry, these directives provide a concrete program of action for the progress of this modern industry, for the diversification and greater competitiveness of its exportable goods.

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